Parent-child interaction therapy in school-aged children with SLI.

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Abstract

Background. Parents play a critical role in their child's language development. Therefore advising parents of a child with language difficulties how to facilitate their child's language might benefit the child. Parent-Child Interaction Therapy (PCIT) has been developed specifically for this purpose. In PCIT, the SLT works collaboratively with parents, altering interaction styles to make interaction more appropriate to their child's level of communicative needs.

Aims. This study investigates the effectiveness of PCIT in 8-10 year-old children with Specific Language Impairment (SLI) in the expressive domain. The study aimed to identify whether PCIT had any significant impact on the following communication parameters of the child: verbal initiations, verbal and non-verbal responses, mean length of utterance (MLU) and proportion of child to parent utterances.

Methods and procedures. 16 children with SLI and their parents were randomly assigned to two groups: treated, or delayed treatment (control). The treated group took part in PCIT over a 4 week block, and then returned to the clinic for a final session after a 6 week consolidation period with no input from the therapist. The treated and control group were assessed in terms of the different communication parameters at three timepoints, pre-therapy, post-therapy (after the 4 week block) and at the final session (after the consolidation period), through video analysis. It was hypothesized that all communication parameters would significantly increase in the treated group over time and that no significant differences would be found in the control group.

Outcomes and results. All the children in the treated group made language gains during spontaneous interactions with their parents. In comparison to the control group, PCIT had a positive effect on three of the five communication parameters: verbal initiations, MLU, and proportion of child to parent utterances. There was a marginal effect on verbal responses, and a trend towards such an effect for non-verbal responses.

Conclusions and implications. Despite the small group sizes, this study provides preliminary evidence that PCIT can achieve its treatment goals with 8-10 year-olds who have expressive language impairments. This has potentially important implications for how mainstream speech and language services provide intervention to school aged children. In contrast to direct 1:1 therapy, PCIT offers a single block of therapy where the parents' communication and interaction skills are developed to

provide the child with an appropriate language-rich environment, which in turn could be more cost-effective for the service provider.

What this paper adds

Section 1: What is already known on this subject.

Extensive research has investigated the effectiveness of Parent-Child Interaction Therapy (PCIT) with pre-school children (Kelman and Schneider, 1994; Cummins and Hulme, 1997), with encouraging results. In contrast, research into collaborative working with parents, and in particular PCIT, with school-aged children is very limited.

Section 2: What this study adds.

This study investigates the effectiveness of PCIT in a group of 8-10 year-old children with Specific Language Impairment in the expressive domain. We show that working collaboratively with parents, to increase their knowledge and communicative confidence with their child, directly improves the child's communication skills. This has important implications for speech and language departments providing services to children of primary-school age.

1. Introduction

1.1 Introduction

Parents play a critical role in their child's language development. Therefore advising parents of children with language difficulties how to facilitate their child's language might benefit the child. An intervention known as Parent-Child Interaction Therapy (PCIT) was originally developed for the management of conduct-disordered young children (Eyberg, 1988) and has more recently been adapted to specifically target language development (Cummins and Hulme, 1997).

The main principle of PCIT is that the Speech and Language Therapist (SLT) guides the parent in improving their knowledge and understanding of their own child's communication. A central feature is the use of video to analyse the transitory nature of communicative interactions (Cummins and Hulme, 1997). By using video, the SLT is able to help the parent identify the type and timing of communicative events within an interaction, to recognize where a child is in his/her communication development, and how the child's timing fits in with the parent's. The parent is encouraged to develop the quality of interaction in spontaneously-occurring events using a number of techniques. It is anticipated that as the quality of the interaction between parent and child improves, so the opportunities for appropriate language learning will increase, to the benefit of the child's language development.

In this study we set out to investigate the effectiveness of PCIT in a group of children with Specific Language Impairment (SLI), in particular children with expressive language difficulties. The term SLI is applied to children who exhibit a significant deficit in language yet display normal hearing, age appropriate scores on tests of non-verbal intelligence and no obvious signs of neurological damage (Leonard, 1998). Given that parents respond to a child's level of communication intent, and children with SLI are less likely to initiate communication, their impairment is predicted to influence the way adults talk to them; this in turn may affect the child's ability to learn from the opportunities provided (Siller and Sigman, 2002). The resultant mismatch of communication input from adults and children is likely to exacerbate the child's communication difficulties (Tannock and Girolametto, 1992). As the aim of

PCIT is to facilitate language development through enhancing the quality of the communicative interaction in naturally occurring contexts (Baxendale and Hesketh, 2003), we investigate in this study whether it will be effective for children with SLI.

1.2 The Role of Parents within Speech and Language Intervention

Desforges and Abouchaar (2003) conducted a review of educational literature into the relationship between parental involvement, parental support and family education on pupil achievement, communication development and adjustment in schools. The authors found that as children spend only 15% of their time in school, they are out of school for much longer periods than they are in it. The literature also suggests that in terms of language, different levels of parental involvement in the primary years have a significantly greater impact on language development than the variations in the quality of school (Desforges and Abouchaar, 2003). Therefore facilitating parents to provide quality interaction at home and in everyday situations is desirable in order for children to develop sound communication skills and achieve academically.

Among the numerous and varied approaches to providing speech and language intervention for school-aged children are approaches that involve parents. There is increasing awareness of the importance of parental involvement in effective speech and language therapy (Baxendale and Hesketh, 2003; Glogowska, 2002, Siller and Sigman 2008). The role of the therapist has changed in line with this, with the focus being on working with parents to enable them to facilitate their child's communication skills in everyday environments rather than being confined to the clinical setting. Benefits to this type of intervention include both sustained and generalizable results (Delprato, 2001; Law, 2003).

1.3 The Parent-Child Interaction Programme

The intervention in PCIT is based on the premise that changing patterns in non-verbal interaction of the adult will improve the child's communicative competence without the need to focus specifically on the child's language skills (Kelman and Schneider, 1994). The use of video analysis during the PCIT process allows parents to subsequently observe how they interact with their child. It is the use of video, and the

detailed observation that it affords, that distinguishes PCIT from the Hanen programme (Pepper and Weitzman, 2004), although the basic philosophy of both programmes is complementary. The importance of enhancing parents' observational skills is key. This is a valuable tool to enable parents to develop a deeper understanding of their child's constructions of the world around them through observation and information provided by the clinician. Giving parents access to information that increases their knowledge of the nature of their child's communication difficulties is an important part of enabling SLTs and parents to work in partnership (Glogowska, 2002).

Specific components of the parent-child interaction have been identified as likely to be affected in interactions between children with language difficulties and their parents. They include the following:

Parental Responsiveness: Responsiveness is described as 'the rate at which carers respond to a child's gestures, vocalizations or other communicative acts' (Anderson and Marinac, 2007). Yoder and Warren (2001) report that the parents of children with language impairments are less responsive to the child's non-verbal communication but focus heavily on their spoken language. Intervention which increases the child's initiation may then in turn increase parental responsiveness. The general consensus among the present literature is that engagement in conversation with an interested adult is one of the most important aspects of interaction in terms of language gains for children with language disabilities (Siller and Sigman 2002).

Parental Directiveness: Parents of children with language difficulties have been found to be not only less responsive, but also more directive. Furthermore, there is a negative correlation between the rate of language learning of children with communication difficulties and levels of parental directiveness (Cross, 1984). Research is not only limited to children with SLI, but in other types of neurological syndromes such as Down's Syndrome, cerebral palsy and learning difficulties which are often associated with increased parental directiveness (Pennington and McConachie, 2001).

Turn-taking: Tannock (1988) found that parents of children with language difficulties contributed more utterances and took more turns than parents of typically developing children. It was also stated that language delayed children experience

difficulty with the synchrony of turn-taking, and therefore require appropriate modeling and increased practice of this.

Semantic Contingency: This refers to the parent's ability to follow the child's intended meaning. Siller and Sigman (2002) found parents of children with language difficulties are less likely to provide contingent feedback and semantically related utterances to topics that are child-initiated. Furthermore, the authors found that the use of semantic contingency is positively associated with children's language development.

Semantic and Syntactic Complexity of the Parent's Language: Cross (1984) found rapid language development in children to be associated with less complex parental input. He stressed the importance of the parent's language input being at the child's level of understanding for maximum language development.

Reinforcement: Newport (1977) found a positive correlation between the number of parental acknowledgments and children's language gains. However Cross (1984) showed that parents of language impaired children are less positive and accepting of their child's utterances.

The research therefore suggests that patterns of parent-child interaction may be disrupted in a variety of ways in the language impaired population, and that altering those parents' interaction might have a positive effect on the children's language gains. This provides a theoretical framework for a programme of intervention which focuses on modifying the quality of the parent-child interaction rather than working specifically on the child's language deficits.

1.4 Effectiveness of Parent-Based Interventions

Law *et al.* (1998), as part of a systematic review of the literature, examined available data on speech and language interventions. In the case of expressive language difficulties, comparable results were observed for indirect (parent-focused) and direct treatment. Similarly, Baxendale and Hesketh (2003) compared parent-based intervention with traditional clinic therapy. They concluded that there were no significant differences in mean language scores between the therapy groups at any

assessment point. This would primarily indicate that parent-based and traditional therapies are equally viable forms of intervention.

Two particular parent-based interventions have been the focus of research so far; these being the 'interactive model' (Tannock and Girolametto, 1992) and 'milieu teaching' (Iacono *et al*. (1998). Both approaches use naturalistic strategies, thereby sharing features such as following a child's lead, organizing the environment to provide communication opportunities, focusing on the child-adult conversational dyad, and providing linguistic models.

Kaiser (1993) developed an Enhanced Milieu Teaching approach utilizing key features of the interactive model and milieu teaching, incorporating direct behavioural techniques, whereby linguistic forms are directly elicited from the child and followed by natural consequences. In a study of Enhanced Milieu Teaching, Kaiser and Hester (1994) found that its use by parents was associated with children's gains in target language skills, intentional communication and number of words used. In addition, Hemmeter and Kaiser (1994) demonstrated maintenance of children's gains and generalization across interactions and settings. These parent and child gains were obtained in relatively brief periods of intervention, e.g. 16 sessions.

A number of advantages have been offered for teaching parents to implement their children's language intervention. Kaiser (1993), for example, argued that this practice is likely to enhance generalization of newly learned skills through the continuation of intervention into a child's daily activities. This consideration has particular relevance if skills are taught in artificial settings, such as clinics, from which generalization can be problematic. Kaiser (1993) also argued the point that parent involvement may have lasting effects beyond the immediate goal of improving the child's communication skills because "different and more positive social communication interaction patterns may be established" (p.64). However, the nature of these effects was not discussed. Involvement of parents in their children's intervention is thought to offer parents a sense of empowerment, since they become an integral part of the intervention team.

Some disadvantages of parent training have also been noted. Hemmeter and Kaiser (1994) report that training parents to use didactic techniques has been criticised for disrupting the parent-child relationship by placing the parent in a role of instructor, for failing to take into account parental needs or desires, and for ignoring the functioning of the child with a language delay within the family unit. In addition, some approaches would seem to be based on an implicit assumption that the interactive styles of parents are problematic, at least in terms of facilitating their child's communication development. There are a number of problems with this assumption. One is that variation in interaction styles exists both within and across parents. A second is that although responsiveness and directiveness have been behaviours most frequently targeted, there is a lack of information as to what may be appropriate levels of these behaviours (Tannock and Girolametto, 1992).

The effectiveness of PCIT with pre-school children has been researched with favourable results, (Lemanek, 1993; Kelman and Schneider, 1994; Siller and Sigman 2002), however the effectiveness of PCIT with school-aged children with SLI remains largely unstudied. This study therefore aims to identify whether specific communication parameters of school-aged children with SLI are influenced by PCIT in a clinical environment. The findings could have important implications for service providers, not least because indirect management has been deemed to be more cost-effective than didactic intervention (Girolametto *et al*. 1993).

2. Methodology

2.1 Participants

Children in mainstream schools in the local area of Adur, Arun and Worthing in the West Sussex Primary Care Trust (Southern England) on the current Speech and Language Therapy caseload, and who met the following criteria, were selected by members of the Speech and Language Therapy Team; Aged between 8-10 years, diagnosed with SLI, as defined by an expressive language score of 16th percentile or lower on the Clinical Evaluation of Language Fundamentals-4 (CELF-4) (Semel *et al*., 2006), and assessed within the previous 5 months, English as first language and

living in monolingual households and no history of moderate/severe hearing impairments. For further baseline measures see Appendix 1.

In total 16 families were recruited to take part in the research. The age of the participants ranged from 8;00 to 9;06 years (Mean = 8;04, Standard Deviation = 0.43) and there were 5 girls and 11 boys. All the children's current level of intervention was maintained throughout the project. Intervention included 1:1 programmes carried out in schools by Teaching Assistants and monitored by therapists, group sessions in school or in clinic, and direct therapy at school or clinics.

2.2 Design

The study used sequential analysis of pre-therapy, post-therapy and final session (after six week consolidation period) between two randomly assigned groups: the treated group (receiving PCIT) and a control group (delayed treatment).

The dynamic nature of the interaction between carer and child is the cornerstone of the intervention programme. One system for recording this data is a coding system (Law *et al*. 1999), which monitors what the child and parent are doing while the interaction is taking place. This coding system was adapted to evaluate the specific communication parameters of interest in this study.

2.3 Procedure

Subsequent to the research project receiving full ethical approval from City University's School of Allied Health Sciences Ethics Committee, parents of the children meeting the above criteria were recommended by SLTs in the Adur, Arun and Worthing Mainstream Team area. These parents and children were then sent an invitation to take part in the study which outlined the programme. Those who expressed an interest in taking part were then sent information detailing the purpose of the study and what their involvement would be. Included in these details were consent forms for both parent and child. During this time parents were invited to come to appointments at their child's school or to have telephone contact to discuss the study further.

The participants were assigned randomly into two groups – Group A, who received treatment immediately, and Group B, who received treatment after treatment for Group A was fully completed. Random assignment was achieved by giving each family a number, in the order the consent forms were received and divided by random number generation.

Group A was then invited to begin the four weekly sessions of PCIT. After completion of the four sessions there was a six week consolidation period before the participants were invited back to the clinic for a final session. Group B was invited to the clinic to video record a play session at week one, when Group A began therapy, week four, when Group A had completed its four weekly therapy sessions and after the six week consolidation period. Group B received therapy after Group A had completed the final session. Only the therapy results for Group A are presented here. The timetable is summarised in Table 1.

Table 1: Timetable for the PCIT programme

	Group A	Group B
Week 1	Parent and child interaction videoed, followed by SLT input (1st PCIT session) Video Analysed	Parent and child interaction videoed, no SLT input. Video Analysed
Week 2	2nd PCIT session	
Week 3	3rd PCIT session	
Week 4	4th PCIT session Video Analysed	Parent and child interaction videoed, no SLT input. Video Analysed
Week 5-9	Consolidation period, no therapist input.	
Week 10	Final PCIT session	Parent and child interaction videoed, no SLT input.

	Video Analysed	Video Analysed

2.4 The PCIT Programme

Children and their parents or main carers were invited to a block of four, once weekly, PCIT sessions. They were asked to play/carry out an activity for 15 minutes whilst being videoed. The intervention took place in a clinic room with a video recorder left running and parents and children given a choice of activities which consisted of Lego, drawing, puppets, skittles and snakes and ladders. Parents were instructed that they could use any part of the room and furniture (tables, chairs or carpet) and to play with their child as they would do at home. They were not put under pressure to elicit spoken language from their child. The SLT observed the interaction from the side of the clinic room.

The video was watched by the parent and the therapist together. The parent's interaction style was discussed, referring to the child's level of needs. The parent was encouraged to discuss ways in which their interaction might be positively influencing their child's language development. The parent was then encouraged to continue using these strategies.

Using the videoed interaction, the parent completed a self-rating scale. Self rating scale items were: Letting my child choose the toy, following what my child wants to do, sitting where my child can easily see me, waiting for my child to start the talking, giving my child extra time to talk, showing that I am listening by repeating or answering, commenting on what my child is doing, not asking my child questions, praising my child, talking slowly enough for my child to understand me. These were rated as Never, Sometimes, Often or All the time. The self-rating scale was piloted with children and parents attending a Special Support Centre in a Mainstream School, during parent consultation meetings. Some modifications were put in place, including re-phrasing some of the statements to make them less ambiguous.

The therapist and parent discussed the relevance of each of the areas being rated. The parent was asked to choose an area of the self-rating scale that they would like to target first. The therapist and parent talked about ways in which this goal was to be

achieved. Throughout the programme the emphasis was put on the parent to analyse the interaction, with support from the therapist when necessary.

Another video was then taken of the parent and child playing together and the parent was asked to use the strategies discussed. The video was watched by the therapist and parent, highlighting positive use of the new strategy and ways in which it could be developed further.

The parent was asked to implement the chosen strategy at home during at least three x 5 minute sessions per week known as 'special time'. During this time any activity could be carried out, such as games, drawing, and pretend play. Parents were asked to record how they felt using the strategies at special time and how it affected their child's interaction, to promote reflective thinking of the interaction.

During the next session (one week later), the previous goal was recapped and a video taken to reinforce this. If the parent felt this goal had been achieved after watching the video a new strategy was discussed as before. If the parent felt the goal had not been achieved further discussion was held on how to implement it into the play sessions. The parent was then given the choice whether a new area should be targeted in the session, or the same strategies practised for another week[1].

On completion of the four weekly sessions, the parent and child were invited back after a six week consolidation period for a final session. During the six week consolidation period, parents were asked to complete 'special time' activities as before, but there was no direct contact with the therapist during this time. However, the parents were provided with contact details of the therapist for further discussion of the strategies if required.

[1] During the PCIT programme three out of the 8 parents targeted, and in their opinion achieved, 5 interaction strategies, three parents targeted 4 strategies and two parents targeted 2 strategies.

In the final session a video was taken of the parent and child playing, and the interaction reviewed in terms of the strategies used by the parent and the impact on the child's communication. Future management was also discussed and parents invited to provide any verbal feedback, which was recorded.

2.5 Analysis of Interaction

Videos for analysis were taken at the initial PCIT session, after completion of the four weekly sessions and during the final session after the six week break. Group B was invited to be videoed at the same time in order to compare the treated and delayed treatment groups.

Law et al. (1999) designed a video coding system as a way of measuring clinical outcomes. Five coding categories were used, three relating to adult input (discourse structure, communicative function and linguistic behavior) and two to the child input (discourse structure and linguistic behavior). This research demonstrated that while it is possible to access a vast range of behaviours associated with interactions, a coding system may not be exhaustive in recording communicative exchanges. This coding system was adapted to focus on the communication parameters used by the child, and the number of child to parent utterances.

The video was observed twice for each communication parameter and recorded manually with pen and paper. The videos were analysed in terms of the following communication parameters of the child:

Number of verbal initiations. Spontaneous utterances with communicative intent. Using words or sounds either with reference to a shared activity or with a clear intent to draw the adult's attention to his/her activity.

Number of verbal responses. Responses with utterances relevant to adult's previous utterance.

Number of non-verbal responses. Response to an adult verbalisation but without words. Responses in this category had to be appropriate to what the adult said for it to be credited, in order to assume the child's understanding. Examples include; pointing, looking, nodding of head, orientation, facial expressions.

Mean length of utterance (MLU). Calculation of the average number of morphemes per utterance.

Proportion of child to parent utterances. The total number of child utterances divided by the number of parental utterances. Parental utterances included those that were initiating communication, responding to the child, directing the child's attention or topic of conversation, or acknowledging the child's communication/intent to communicate.

These parameters were analysed over a 5 minute period in the mid section of the videos (minutes 5-10 in a 15 minute video), as described by Cummins and Hulme (1997). To avoid bias in the analysis, assessors who were blind to which children were from the treated and control groups analysed randomly allocated videos after the four week therapy block and after the six week consolidation period. These blind assessors were SLTs trained in PCIT. Inter-rater reliability tests were carried out by assessor 'a' completing a full rating of a child originally rated by assessor 'b' and vice versa. Agreement was found to be reasonable and full figures are reported in the Appendix 2.

It was not possible to re-assess the participants' language scores using formal assessment due to time limitations impacting on test-retest reliability. The analysis therefore only includes PCIT data with no validity testing, and in the absence of other language measures conclusions can only be drawn as to whether the therapy goals were achieved.

2.6 Hypotheses

It was hypothesized that there would be a significant increase in each of the communication parameters in the treated group over time and no significant differences in the control group over time.

3. Results

The total number of items within each communication parameter, i.e., number of verbal initiations, number of verbal responses, number of non-verbal responses and

mean length of utterance, was counted over a 5 minute period for each child pre- and post- therapy, and at the final session after the six week consolidation period. The proportion of child to parent utterance was calculated as the total number of child utterances divided by the total number of parent utterances (for raw data from 2 particular children, see appendix 1).

The communication parameters were analysed using the Statistical Package for the Social Sciences (SPSS, version 16.0, 2008, Chicago, USA). Each of the communication parameters was subjected to a Two-Way Analysis of Variance (repeated measures), in a 3 (time: pre-therapy/ post-therapy/ final session) x 2 (group: treated/ control) design. The source of significant interactions between time and group was explored using a series of t-tests within and between groups, with the alpha level set to 0.006 to account for multiple comparisons (N=9). We also report effect sizes as partial eta-squared (η_p^2), with 0.01 being considered a small, 0.06 a moderate and 0.14 a large, effect size (Cohen, 1988).

Analysis of Verbal Initiations

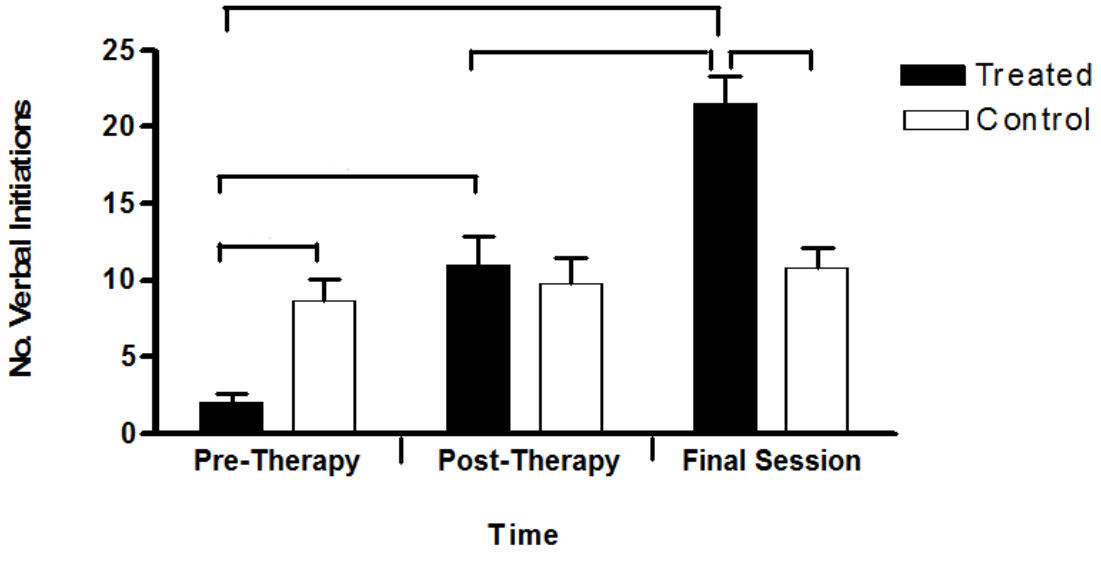

Figure 1: Graph showing number of verbal initiations in each group at pre-therapy, post-therapy and the final session. Bars show differences significant at p < 0.006.

Figure 1 shows a significant increase in the number of verbal initiations in the treated group at all time intervals. A 3(time: pre-therapy, post-therapy, final session) x

2(group: treated, control) ANOVA revealed a significant main effect of time, $F(2,28) = 46.34$, $p < 0.001$, $\eta_p^2 = 0.799$, but no effect of group $F(1, 14) = 1.31$, $p = 0.271$, $\eta_p^2 = 0.067$. The interaction between time and group was significant, $F(2, 28) = 38.02$, $p<0.001$, $\eta_p^2 = 0.720$.

To examine the interaction, a series of paired samples t-tests compared the number of verbal initiations between each pair of time points, within each group. At the corrected alpha level of 0.006, the treated group showed a significant increase in verbal initiations between each of the time points: pre- versus post-therapy, $t(7) = -4.403$, $p=0.003$, post-therapy versus final, $t(7) = -5.030$, $p= 0.002$, and pre-therapy versus final, $t(7) = -12.422$, $p<0.001$. There were no significant differences in the control group at any time point: all $ps > 0.006$.

The interaction was further examined using a series of independent t-tests comparing the number of verbal initiations by the two groups at each time point. At the corrected alpha level of 0.006, the control group actually had more verbal initiations than the treated group pre-therapy, $t(14) = -4.162$, $p=0.001$, whereas there were no significant differences between the groups post-therapy, $t(14) = 0.502$, $p=0.624$, and at the final session the treated group made significantly more verbal initiations compared to the control group, $t(14) = 4.646$, $p< 0.001$.

The results demonstrate that parents who participate in PCIT provide their children with significantly more opportunities to initiate verbal contributions during interaction than those parents who do not participate in the therapy.

Analysis of Verbal Responses

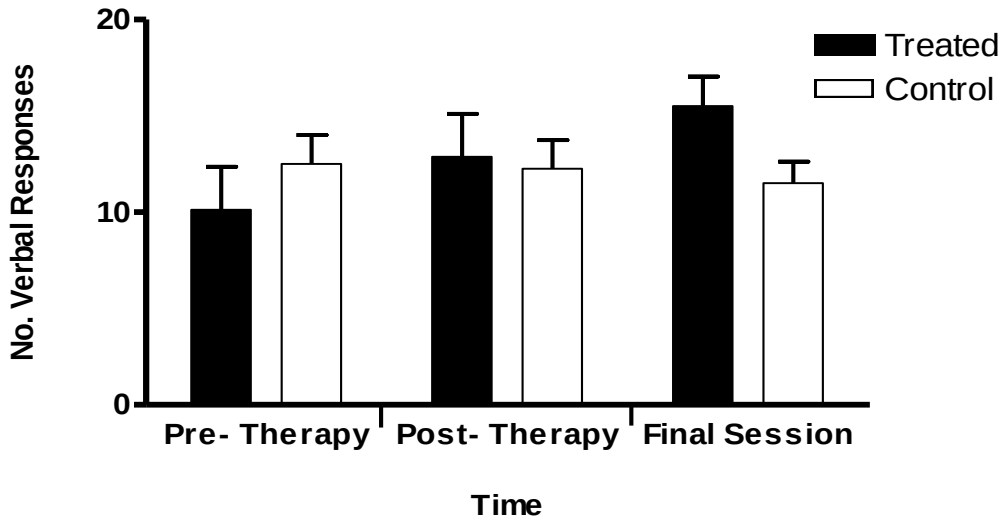

Figure 2: Graph showing number of verbal responses in each group at pre-therapy, post-therapy and the final session. Bars show differences significant at p < 0.006.

A 3(time: pre-therapy, post-therapy, final session) x 2(group: treated, control) ANOVA revealed no significant effect of time $F(2, 28) = 1.58$, $p = 0.222$, $\eta_p^2 = 0.102$, and no significant effect of group, $F(1, 14) = 0.14$, $p = 0.713$, $\eta_p^2 = 0.010$. The interaction between time and group just reached significance but with a large effect size, $F(2, 28) = 3.35$, $p = 0.050$, $\eta_p^2 = 0.193$.

To examine the interaction, a series of paired samples t-tests compared the number of verbal responses between each pair of time points, within each group. None of the differences reached significance, all ps > 0.006. Similarly, none of the independent t-tests comparing the two groups at each time point reached significance, all ps > 0.006.

The interaction between group and time indicates that the number of verbal responses made by the treatment group does increase during the PCIT programme, and that this is not the case for the control group. However, despite the large effect size of this interaction, the lack of significant differences on follow-up t-testing means that the result should be interpreted with caution.

Analysis of Non-Verbal Responses

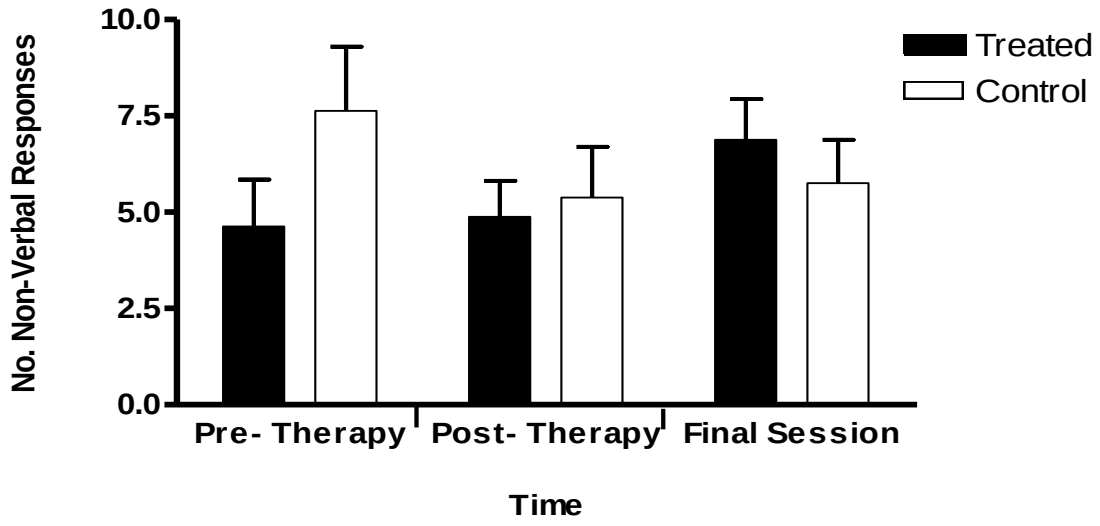

Figure 3: Graph showing number of non-verbal responses in the two groups at pre-therapy, post-therapy and the final session. Bars show differences significant at $p < 0.006$.

A 3(time: pre-therapy, post-therapy, final session) x 2(group: treated, control) ANOVA revealed no significant main effect of time $F(2, 28) = 1.16$, $p = 0.329$, $\eta_p^2 = 0.076$, and no significant main effect of group, $F(1, 14) = 0.29$, $p = 0.599$, $\eta_p^2 = 0.020$. Nor was the interaction between time and group significant $F(2, 28) = 3.07$, $p = 0.063$, $\eta_p^2 = 0.180$.

This indicates that the quality of the parent-child interaction does not significantly affect the number of non-verbal responses given by the child.

Analysis of Mean Length of Utterance

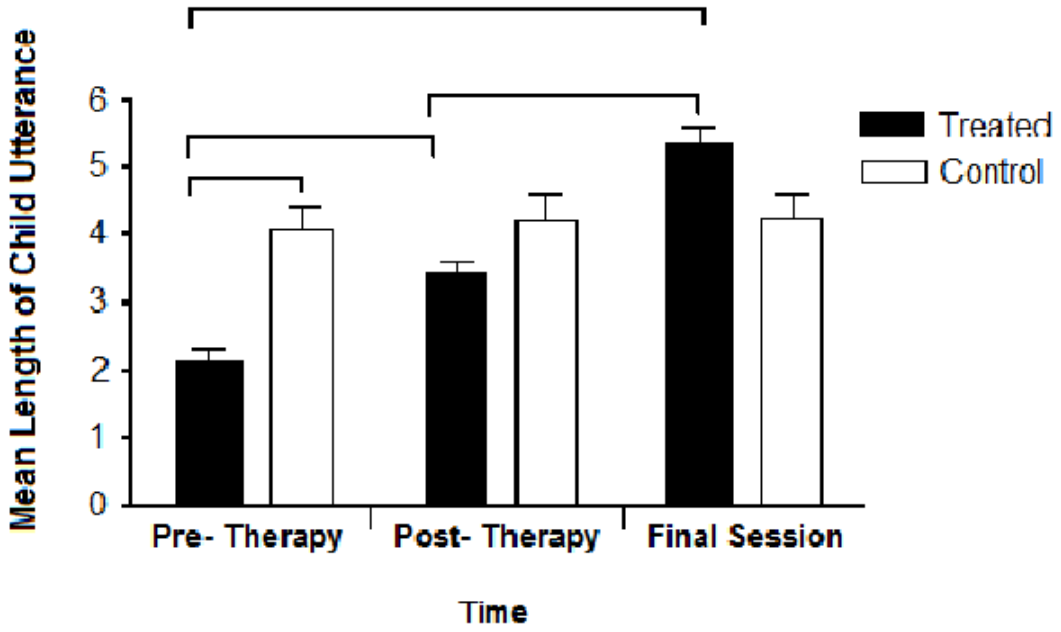

Figure 4: Graph showing mean length of child utterance in the two groups at pre-therapy, post-therapy and the final session. Bars show differences significant at p < 0.006.

A 3(time: pre-therapy, post-therapy, final session) x 2(group: treated, control) ANOVA revealed a significant main effect of time, $F(2,28) = 120.25$, $p<0.001$, $\eta_p^2 = 0.883$, but no effect of group $F(1, 14) = 2.09$, $p=0.170$, $\eta_p^2 = 0.135$. The interaction between time and group was significant, $F(2, 28) = 94.42$, $p<0.001$, $\eta_p^2 = 0.856$.

To investigate the interaction, a series of paired samples t-tests compared MLU between each pair of time points, within each group, with the alpha level corrected to 0.006. For the treated group, there was a significant increase in MLU between each of the time points: pre- versus post-therapy, $t(7) = -9.048$, $p<0.001$, post-therapy versus final, $t(7) = -9.249$, $p<0.001$, and pre-therapy versus final, $t(7) = -13.270$, $p<0.001$. In contrast, there were no significant differences in the control group between pairs of time points, all $p > 0.006$.

The interaction was further examined using a series of independent t-tests comparing the two groups' MLU at each time point, again with a corrected alpha value of 0.006. At pre-therapy, the control group actually had a higher mean length of utterance than

the treated group, t(14) = -4.656, p<0.001, whereas at post-therapy and in the final session both differences were non-significant, ps>0.006.

The results indicate that PCIT has a measurable effect on the morphosyntactic quality of children's utterances during interaction with their parents.

Analysis of the Proportion of Child to Parent Utterances

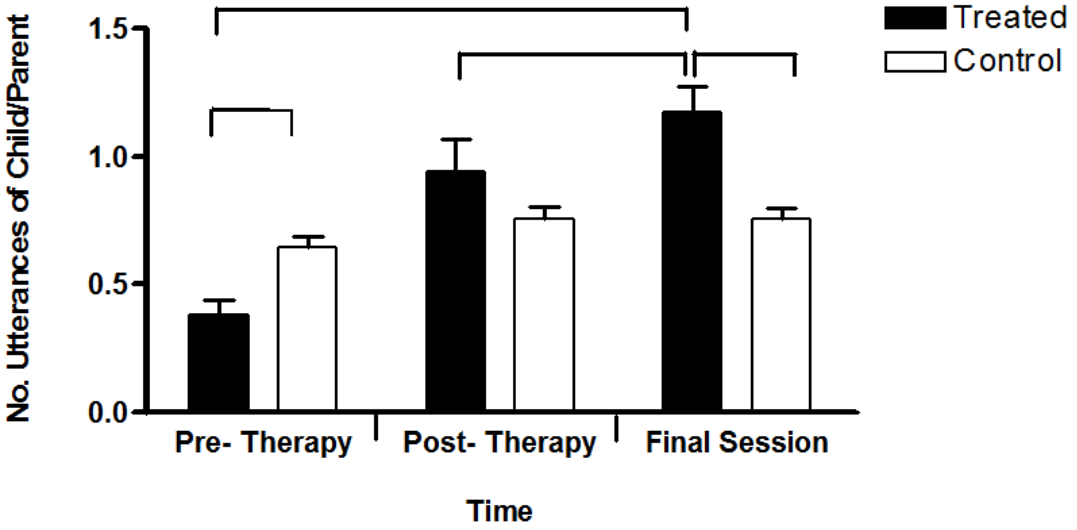

Figure 5: Graph showing proportion of child to parent utterances in the two groups at pre-therapy, post-therapy and the final session. Bars show differences significant at p < 0.006.

A 3(time: pre-therapy, post-therapy, final session) x 2(group: treated, control) ANOVA revealed a significant main effect of time, F(2,28) = 23.28, p< 0.001, η_p^2 = 0.624, but no effect of group F(1, 14) = 2.48, p=0.138, η_p^2 = 0.150. The interaction between time and group was significant, F(2, 28) = 12.89, p<0.001, η_p^2 = 0.479.

To evaluate the interaction, a series of paired samples t-tests compared the proportion of child to parent utterances between each pair of time points, within each group. For the treated group, the increase in the proportion of child to adult utterances between two sets of time points was significant at the corrected alpha level of 0.006 for the following comparisons: pre-therapy versus final, t(7) = -5.611, p= 0.001, and post-therapy versus final, t(7) = -4.661, p=0.002. The increase was only marginally significant for pre- versus post-therapy, t(7) = -3.345, p=0.012. There were no

significant differences in the control group between any sets of time points, all ps>0.006.

The interaction was further evaluated by a series of independent samples t-tests comparing the two groups' proportion of child to adult utterances at each time point,. At pre-therapy the control group actually produced a higher proportion of child to adult utterances that the treatment group, $t(14) = -3.657$, $p = 0.003$. At post-therapy there was no significant difference between the two groups, $t(14) = 1.403$, $p=0.182$. At the final session the treated group had a significantly higher proportion of child to adult utterances compared to the control group, $t(14) = 3.848$, $p=0.002$.

The results indicate that PCIT allows parents in the treated group to develop their communication skills so the interaction with their child becomes more evenly balanced in terms of spoken communication.

Individual results

We present individual children's scores, at pre-therapy and at the final session, in Tables 2 and 3 (the post-therapy session data are excluded for the sake of ease of interpretation). It can be seen that for the treated group, there were increases for 8/8 children on verbal initiations, 5/8 on verbal responses, 5/8 on non-verbal responses, 8/8 on MLU and 8/8 on the proportion of child to adult sentences. For the control group, there were increases for 7/8 children on verbal initiations, 3/8 on verbal responses, 1/8 on non-verbal responses, 8/8 on MLU and 5/8 on the proportion of child to adult sentences.

Table 2. Individual scores for children in the treated group. Indicated in bold are the children who show an increase for each individual parameter.

Child	Verbal initiations		Verbal responses		Non-verbal responses		Mean length of utterance		Proportion of child to adult utterances	
	pre-therapy	final	pre-therapy	final	pre-therapy	final	pre-therapy	final	pre-therapy	final

1	**2**	**18**	**16**	**20**	10	5	**1.25**	**4.60**	**0.56**	**1.06**
2	**0**	**20**	17	15	**3**	**8**	**2.00**	**4.80**	**0.39**	**0.97**
3	**5**	**25**	**5**	**16**	10	5	**2.61**	**5.60**	**0.23**	**1.16**
4	**3**	**26**	18	18	3	2	**1.40**	**5.10**	**0.56**	**1.27**
5	**1**	**22**	12	10	**2**	**6**	**2.50**	**5.12**	**0.54**	**0.95**
6	**3**	**19**	**3**	**11**	**5**	**7**	**2.10**	**5.43**	**0.13**	**1.82**
7	**2**	**29**	**6**	**22**	**2**	**7**	**2.62**	**4.90**	**0.32**	**1.04**
8	**0**	**13**	**4**	**12**	**2**	**9**	**2.40**	**6.86**	**0.33**	**1.12**
Mean change	19.5		5.38		2.25		3.19		0.79	

Table 3. Individual scores for children in the control group. Indicated in bold are the children who show an increase for each individual parameter.

Child	Verbal initiations		Verbal responses		Non-verbal responses		Mean length of utterance		Proportion of child to adult utterances	
	pre-therapy	final	pre-therapy	final	pre-therapy	final	pre-therapy	final	pre-therapy	final
9	**6**	**8**	**5**	**8**	5	3	**4.32**	**4.45**	**0.52**	**0.61**
10	**13**	**15**	**12**	**13**	15	10	**3.80**	**3.98**	0.82	0.78
11	**7**	**9**	8	7	**2**	**4**	**2.20**	**2.54**	**0.48**	**0.57**
12	11	10	16	12	11	9	**3.91**	**4.23**	0.74	0.73
13	**5**	**10**	15	13	10	4	**4.52**	**4.34**	**0.66**	**0.74**
14	**16**	**18**	18	12	8	8	**5.83**	**5.93**	0.76	0.74
15	**5**	**9**	**12**	**17**	9	7	**4.31**	**4.41**	**0.54**	**0.88**
16	**6**	**7**	14	10	1	1	**3.35**	**4.00**	**0.64**	**0.97**
Mean change	2.13		-1.00		-1.88		0.31		0.11	

4. Discussion

This study aimed to evaluate the effect of PCIT on children of school age with SLI in the expressive domain. This was achieved through measuring specific communication parameters of children in a treated and control group, pre- and post- therapy and after a 6-week consolidation period. It was predicted that the communication parameters of the child that we measured, i.e. verbal initiations, verbal responses, non-verbal responses, mean length of utterance (MLU) and proportion of child to parent utterances, would increase significantly in the treated group but that this would not be the case for the control group.

In this section we discuss the results for the five communication parameters measured, and then turn to an overall evaluation of the study, including avenues for further research. To aid the reader, we have summarised the results of the group analyses in Appendix 3.

PCIT aided three communication parameters: the number of verbal initiations made by the child, MLU, and the proportion of child to parent utterances. For these three parameters, differences between the pre-test and subsequent time points were found only for the treated group and not for the untreated controls, showing that the interaction strategies used in PCIT have positive effects on the child's communication. As the parent develops the strategies targeted, e.g. provides more time for the child to respond, asks fewer questions and follows the child's lead, the communication becomes more child-led, and so the child offers more spontaneous verbal initiations. With respect to MLU, the strategy of parents allowing their child more time to respond provides the child with more processing time to formulate grammatically more complex sentences, including those that the parents have previously been modelling. Furthermore, as parents target interaction strategies appropriate for the level of the child, the child is able to develop turn-taking skills in conversation and the interaction between child and parent becomes more balanced.

For verbal responses we found a significant interaction between group and time, reflecting an increase, albeit non-significant, in the number of verbal responses in the

treated group over time, but no such increase for the control group. There was a trend towards an interaction between group and time for non-verbal responses.

In summary, patterns of parent-child interaction may be disrupted in a variety of ways in the language impaired population, and our results show that altering these patterns has a positive effect on the children's language gains during spontaneous interaction with their parents in a clinic setting.

Implications

Our findings provide a framework for a programme of intervention which focuses on modifying the quality of the parent-child interaction rather than working specifically on the child's language deficits.

From a purely clinical perspective, the study of the children's performance proved useful in demonstrating gains to the children's language parameters and encouraging the parents to take credit for such gains. Although the study did not allow comparison with clinician-delivered direct therapy, it did address parents' concern that their children may not be making gains in communication performance without individual and regular treatment, due to the random assignment of the children into treated and control groups.

Motivation is an important variable that should be considered. The parents who attended the study and participated in the sessions may be mothers who wanted to play an active role in their child's communicative development and were aware of the need to attend speech and language therapy sessions. However, over 50% of the parents invited to the study were unable to attend, the majority citing childcare as their reason. It appears therefore that running sessions without childcare facilities may restrict the access for parents who do not have additional support, e.g. a partner or extended family to care for their children while they attend the intervention. Glogowska (2002) highlights that parents who failed to attend therapy appointments 'were often experiencing high levels of social problems and marital breakdowns.'

Delivering an indirect service can have important cost implication as described by Gibbard *et al*. (2004), where results suggested that using parent-based intervention could potentially reduce costs to the service by increasing appropriate parental interaction skills that can be generalised to other siblings, and through further research into running group PCIT sessions.

Limitations

Results should be evaluated with caution due to the limited sample size used in the research, and the restriction to children with SLI in the expressive domain, and therefore results cannot be assumed for the receptive domain. As the analysis was based on PCIT data alone it is not possible to validate therapy gains against language development in formal assessment. It is therefore only possible to conclude that the therapy goals were achieved, and not that the benefits of therapy generalised. If resources had allowed, it would have been valuable to have recalled the participants after a 6 month period in order to repeat and compare the formal assessment data, and to determine whether the benefits of such a short programme of PCIT could be sustained over a long-time frame.

It should be noted that use of a coding scheme is not an exhaustive system of recording all interactions and further information as to the content of utterances would be beneficial. There can also be a degree of subjectiveness as to how the assessor interprets verbal and non-verbal communication intent. A limited number of therapy sessions were provided in the PCIT procedure and further attention should be given to results after longer blocks of intervention.

Despite these limitations, we believe that the results presented here are very encouraging for a first investigation of the effectiveness of PCIT in school-aged children with SLI.

Future Research

These language gains have been evaluated through interaction between the child and parent in a clinic environment. It would be of interest to further analyse whether these

language gains have been generalised with different adults, e.g. assessors, clinicians, teachers and within other environments, e.g. classroom, home.

After completion of the PCIT programme some parents wanted to know more about their child's current speech and language programme running at school, and how they could specifically target this through their sessions and interactional techniques. Although this was only touched upon with a few parents, it may be useful to take account of this in future research in order to plan for a more 'milieu' approach, where parents can target use of new language in functional contexts, as described by Iacono *et al*. (1998). It would also be beneficial to carry out in-depth interviews with those parents who are unable to attend PCIT sessions, in order to provide insight in to what would make it easier for them to attend.

Consideration should be given to running group PCIT sessions. This will allow parents further support from their peers and should be analysed in terms of cost effectiveness in order for this intervention to be more valuable to current health care providers. Further investigation should also be given to carrying out the PCIT programme with secondary caregivers and teaching assistants at schools. Teaching assistants are frequently responsible for carrying out speech and language programmes with children with speech and language disorders in schools. It would be beneficial to the intervention package for these teaching assistants to have the appropriate underlying communication skills and confidence necessary, before being asked to build on these skills in order to carry out specific speech and language programmes.

Further research would be beneficial to identify how the PCIT programme can be used and adapted for children of similar age with other communicative disorders, e.g. phonology delay/disorders, stammers, receptive language delay. It is suggested that in order to do this, research would have to be carried out in how to adapt the programme to incorporate the 'milieu' approach (Iacono *et al.,* 1998) so that specific communication disorders can be targeted as well as parental interactions.

Conclusion

In contrast to direct one-to-one therapy, PCIT offers a single block of therapy where the parents' communication and interaction skills are developed to provide the child with an appropriate language-rich environment. Despite the small number of participants, this study provides preliminary evidence that PCIT can achieve its treatment goals with 8-10 year-olds who have expressive language impairments. This finding has potentially important implications for how mainstream speech and language services provide intervention to school aged children: PCIT could be more cost-effective for the service provider than one-to-one therapy.

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Appendix 1

Child	Age	M/F	CELF-4 Subtest Percentile Scores		Category of Impairment (as indicated on the expressive language scores)
			Receptive Language	Expressive Language	
1	8;00	M	34	4	Semantic
2	9;06	M	65	12	Semantic
3	8;02	M	26	8	Syntactic
4	9;01	F	81	5	Semantic + Syntactic
5	8;11	F	55	10	Syntactic
6	8;01	M	48	6	Syntactic
7	8;09	M	56	1	Semantic + Pragmatic
8	9;02	M	71	5	Semantic + Syntactic
9	8;00	M	24	11	Semantic
10	8;03	M	36	3	Syntactic
11	8;04	F	31	2	Syntactic
12	8;11	M	49	<1	Syntactic
13	9;00	F	29	8	Semantic + Pragmatic
14	8;01	M	54	7	Syntactic
15	8;01	M	64	2	Syntactic
16	8;10	F	47	1	Syntactic

Appendix 2

Inter-Rater Reliability

Child 1

Assessor A

Communication Parameter	**Tally Count**
Verbal initiations (spontaneous with communicative intent)	5
Verbal responses (relevant to adults' previous utterance)	12
Non-verbal response	2
Mean length of utterance	1.4
Proportional number of utterances of child to parent	20/39 = 0.51

Assessor B

Communication Parameter	**Tally Count**
Verbal initiations (spontaneous with communicative intent)	5
Verbal responses (relevant to adults' previous utterance)	13
Non-verbal response	3
Mean length of utterance	1.3
Proportional number of utterances of child to parent	21/38 = 0.55

Child 2

Assessor A

Communication Parameter	**Tally Count**
Verbal initiations (spontaneous with communicative intent)	15
Verbal responses (relevant to adults' previous utterance)	13
Non-verbal response	10
Mean length of utterance	3.98
Proportional number of utterances of child to parent	32/41 = 0.78

Assessor B

Communication Parameter	**Tally Count**
Verbal initiations (spontaneous with communicative intent)	13
Verbal responses (relevant to adults' previous utterance)	15
Non-verbal response	8
Mean length of utterance	3.78
Proportional number of utterances of child to parent	31/42 = 0.74

Appendix 3

Summary of results across the different communication parameters. For the sake of simplicity, we present the results for only 2 out of the 3 timepoints – pre-therapy and the final session after a 6-week consolidation period. The full set of results is presented in the text.

Did communication parameter respond to PCIT?	Communication parameter	Interaction time x group	Pre-therapy versus final session[1]		Treated group versus control group[2]	
			Treated group	Control group	Pre-therapy	Final session
Yes	Verbal initiations	F=38.02 p<0.001	t=-12.422 p<0.001	t=-1.155 p=0.286	t=-4.162 p=0.001	t=4.646 p<0.001
	Verbal responses	F=3.35 p=0.050	t=-2.331 p=0.053	t=0.574 p=0.584	t=-0.881 p=0.393	t=2.106 p=0.054
	Mean Length of Utterance	F=94.42 p<0.001	t=-13.270 p<0.001	t=-2.408 p=0.047	t=-4.656 p<0.001	t=2.593 p=0.021
	Proportion of child to parent utterances	F=12.89 p<0.001	t=-5.611 p=0.001	t=-2.032 p=0.082	t=-3.657 p=0.003	t=3.848 p=0.002
No	Non-verbal responses	F=3.07 p=0.063	–	–	–	–

Key:

[1] A negative t-value indicates an increase in this parameter between the pre-therapy session and the final session.

[2] A negative t-value means that the control group scored more highly than the treated group at the pre-therapy session, which was a consequence of random allocation of participants to the treatment or control group.